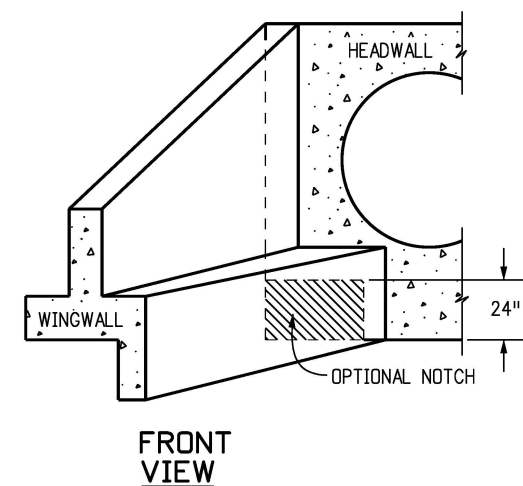
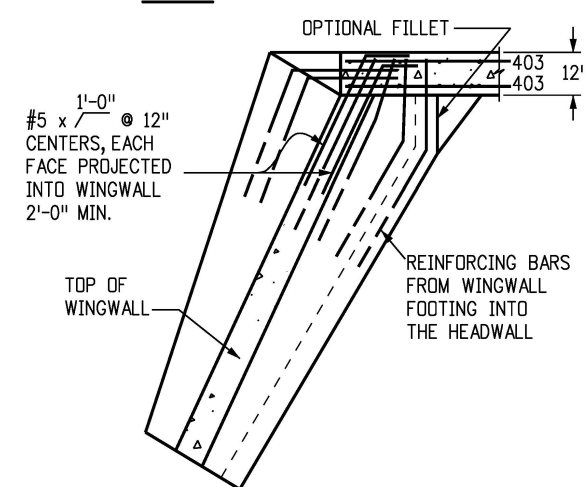


TYPICAL BAR LAYOUT FOR CONCRETE HEADWALLS

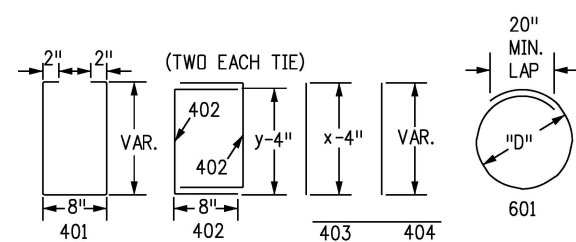


FRONT VIEW



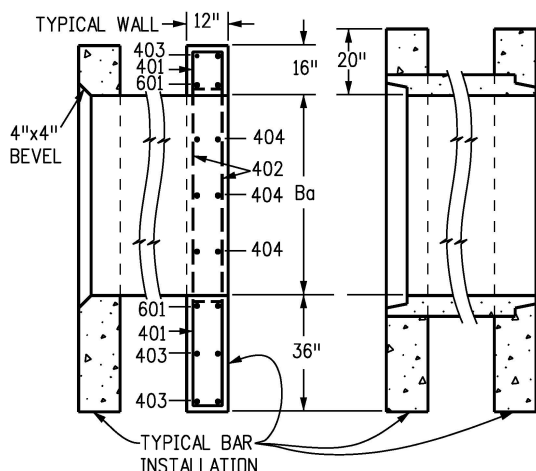
TOP VIEW

WINGWALL CONNECTION



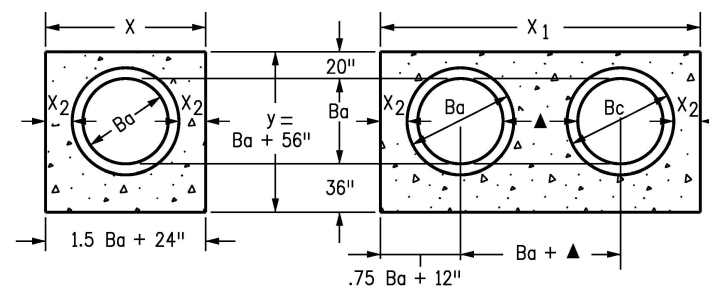
RIGID PIPE = $B_c + 6"$
 FLEXIBLE PIPE = $B_a + 8"$
 FLEXIBLE ARCH = $SPAN + 8"$
 STRUCTURAL PLATE ARCH = $RISE + 8"$

BAR BENDING



INLET OUTLET ENDS OF FLEXIBLE PIPE

INLET OUTLET ENDS OF RIGID PIPE

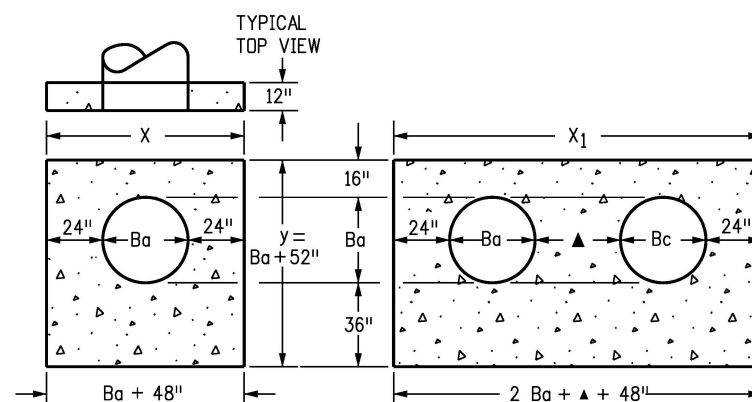


DIMENSIONS

Ba IN.	Bc IN.	X FT.-IN.	A IN.	X ₁ FT.-IN.	A ₁ IN.	y FT.-IN.	B IN.	X ₂ IN.	CONCRETE		STEEL	
									SGL CU. YD.	DBL CU. YD.	SGL LBS.	DBL LBS.
54	65	8-9	8 1/2	15-6	7	9-2	17	20	2.12	3.55	209	364
60	72	9-6	7	17-0	10	9-8	11	21	2.35	3.99	236	414
66	79	10-3	11 1/2	18-6	7	10-2	14	22	2.60	4.44	249	453
72	86	11-0	10	20-0	10	10-8	17	23	2.85	4.91	270	476
78	93	11-9	8 1/2	21-3	11	11-2	11	24	3.11	5.29	306	527
84	100	12-6	7	22-6	7	11-8	14	25	3.38	5.68	333	572
90	107	13-3	11 1/2	23-9	8 1/2	12-2	17	26	3.66	6.08	335	593
96	114	14-0	10	25-0	10	12-8	11	27	3.94	6.48	379	649
102	121	14-9	8 1/2	26-3	11 1/2	13-2	14	28	4.24	6.89	400	664
108	128	15-6	7	27-6	7	13-8	17	29	4.54	7.30	424	707

QUANTITIES

HEADWALL FOR RIGID ROUND PIPE

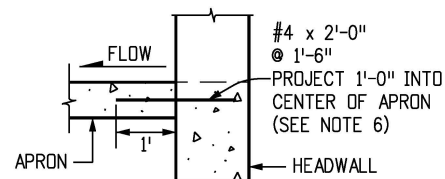


DIMENSIONS

Ba IN.	X FT.-IN.	A IN.	X ₁ FT.-IN.	A ₁ IN.	y FT.-IN.	B IN.	CONCRETE		STEEL	
							SGL CU. YD.	DBL CU. YD.	SGL LBS.	DBL LBS.
54	8-6	7	15-3	11 1/2	8-10	15	2.19	3.81	211	358
60	9-0	10	16-6	7	9-4	18	2.38	4.25	217	396
66	9-6	7	17-9	8 1/2	9-10	12	2.58	4.70	252	454
72	10-0	10	19-0	10	10-4	15	2.78	5.17	255	472
78	10-6	7	20-0	10	10-10	18	2.98	5.56	276	499
84	11-0	10	21-0	10	11-4	12	3.19	5.95	297	553
90	11-6	7	22-0	10	11-10	15	3.40	6.36	317	517
96	12-0	10	23-0	10	12-4	18	3.62	6.79	321	597
102	12-6	7	24-0	10	12-10	12	3.84	7.21	364	663
108	13-0	10	25-0	10	13-4	15	4.06	7.63	362	678

QUANTITIES

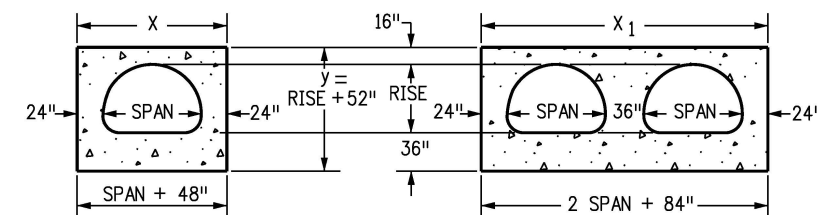
HEADWALL FOR FLEXIBLE ROUND PIPE



WHEN APRON IS REQUIRED

GENERAL NOTES

1. CONCRETE SHALL BE CLASS B.
 2. HEADWALL SHALL BE PERPENDICULAR TO THE PIPE C UNLESS OTHERWISE SHOWN ON THE PLANS. TABULATED DIMENSIONS AND QUANTITIES MUST BE ADJUSTED FOR SKEWED INSTALLATIONS.
 3. FOR WINGWALL DETAILS, SEE STANDARD PLAN M-601-20.
 4. VOLUME OCCUPIED BY PIPE HAS BEEN DEDUCTED FROM STEEL AND CONCRETE QUANTITIES.
 5. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 IN.
 6. ALL REINFORCING BARS SHALL HAVE A 2 IN. MINIMUM CLEARANCE.
- ▲ WHEN TWO OR MORE PIPES ARE LAID SIDE BY SIDE, THEY SHALL BE PLACED SO THAT THE ADJACENT PIPES WILL BE 1/2 INSIDE DIAMETER APART, OR 1/2 INSIDE SPAN APART, OR 3 FT. APART (INCLUDING WALL THICKNESS), WHICHEVER IS LESS.
- ADD 0.89 x (X OR X₁) (LB.) WHEN APRON IS REQUIRED.



DIMENSIONS

EQUIV. Ba IN.	SPAN IN.	RISE IN.	X FT.-IN.	A IN.	X ₁ FT.-IN.	A ₁ IN.	y FT.-IN.	B IN.	CONCRETE		STEEL	
									SGL CU. YD.	DBL CU. YD.	SGL LBS.	DBL LBS.
72	81	59	10-9	8 1/2	20-6	7	9-3	17 1/2	2.72	5.10	250	467
78	87	63	11-3	11 1/2	21-6	7	9-7	10 1/2	2.85	5.34	275	531
84	95	67	11-9	8 1/2	22-10	9	9-11	12 1/2	3.08	5.79	290	547
90	103	71	12-7	7 1/2	24-2	11	10-3	15	3.30	6.21	321	591
96	112	75	13-4	12	25-8	8	10-7	16 1/2	3.52	6.65	314	606
102	117	79	13-9	8 1/2	26-6	7	10-11	9 1/2	3.63	6.86	356	672
108	128	83	14-8	8	28-4	12	11-3	11 1/2	3.96	7.51	376	699

QUANTITIES

HEADWALL FOR FLEXIBLE PIPE ARCH

DIMENSIONS

EQUIV. Ba IN.	SPAN FT.-IN.	RISE FT.-IN.	X FT.-IN.	A IN.	X ₁ FT.-IN.	A ₁ IN.	y FT.-IN.	B IN.	CONCRETE		STEEL	
									SGL CU. YD.	DBL CU. YD.	SGL LBS.	DBL LBS.
66	6-1	4-7	10-1	10 1/2	19-2	11	8-11	15 1/2	2.52	4.70	232	424
75	7-0	5-1	11-0	10	21-0	10	9-5	9 1/2	2.80	5.25	282	509
84	7-11	5-7	11-11	9 1/2	22-10	9	9-11	12 1/2	3.08	5.79	291	540
93	8-10	6-1	12-10	9	24-8	8	10-5	15 1/2	3.36	6.33	309	622
102	9-9	6-7	13-9	8 1/2	26-6	7	10-11	9 1/2	3.63	6.86	379	673
111	10-11	7-1	14-11	9 1/2	28-10	9	11-5	12 1/2	4.05	7.67	377	711
120	11-10	7-7	15-10	9	30-8	8	11-11	15 1/2	4.36	8.28	395	731
132	12-10	8-4	16-10	9	32-8	8	12-8	11	4.75	9.03	441	839
141	14-1	8-9	18-1	10 1/2	35-2	11	13-1	13 1/2	5.17	9.86	448	931
150	15-4	9-3	19-4	12	37-8	8	13-7	16 1/2	5.69	10.88	490	953
159	15-10	9-10	19-10	9	38-8	8	14-2	11	5.89	11.25	534	1019

QUANTITIES

HEADWALL FOR STRUCTURAL PLATE ARCH

SKEW ANGLE A°	90	85	80	75	70	65	60	55	50	45	40	35	30
FACTOR (cosecA°)	1.000	1.004	1.015	1.035	1.064	1.103	1.155	1.221	1.305	1.414	1.556	1.743	2.000

SKEW FACTOR TABLE

Computer File Information

Creation Date: 07/31/19
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Last Modification Date: 07/31/19
Detailer Initials: LTA
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
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Project Development Branch

JBK

HEADWALL FOR PIPES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.

M-601-10

Standard Sheet No. 1 of 1

Project Sheet Number: